METER UNIT

TYPE 70A

INSTRUCTION MANUAL

DYMAR ELECTRONICS LIMITED.
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METER UNIT

TYPE 70A

CONTENTS

1. General Description
2. Specification
3. Operation
4. Technical Description
5. Maintenance & Calibration
6. Parts List
7. Circuit Diagram
8. Guarantee

1. General

The Type 70A Meter Unit acts as the Main Instrument Frame for the 700 Series of Dymar Plug-In Laboratory Instruments. It provides the comprehensive power supplies necessary for energizing the various Plug-Ins and the analogue read-out in the form of a 5" Meter Movement fitted with anti-parallax mirror for greater reading accuracy.

The Meter Unit is primarily designed for free standing operation on a bench and a handle on the bottom cover can be used for tilting the instrument upward. Alternatively a rack-mounting adaptor kit can be supplied which will enable the instrument to be mounted in a 19" Post Office rack. When mounted in a rack the panel space occupied is 7" provided that the carrying handle, the tilting handle and the four rubber feet are removed from the top and bottom covers respectively.

2. Specification

Meter:

Sensitivity	-	100μA at f.s.d.
Accuracy	-	±1% of f.s.d.
Impedance	-	3.16KΩ temperature compensated
Scales	-	0-10 linear
		0-3.16 linear
		-12db to 2db logarithmic

Power Input: 100-140 volts or 200-250 volts 50/60 Hz

Voltage Outputs:

250 Volts DC at 40mA regulated
400 Volts DC at 20mA unregulated
12.6 Volts DC at 0.6A regulated
6.3 Volts AC at 1.5A
12.6 Volts AC at 0.6A Centre-tapped
All supplies floating with respect to chassis ground

Regulation: 1% at maximum rated load

Stability: 1% for ± 10% voltage change

Ripple Voltage:

250 Volt line 5mV
12.6 Volt line 3mV

Dimensions:

	Type 70A	Type 70AR
Width	16½"	19"
Height	6½"	7"
Depth	8½"	8½"
Weight without Plug-In	13½lbs.	14 lbs.
With Average Plug-In	17 lbs.	17½lbs.

3. Operation.

3.1. Mains Input Voltage.

It is very important that the instrument is operated with the transformer taps set correctly to the available Mains Voltage. The instrument as despatched from the factory is set for operation at 240 volts and operation at other voltages in the range of 200–250 Volt requires changing the input taps on the transformer as illustrated below. Furthermore to change for operation with an input voltage range 100–140 Volts, the wire link connecting the two primary windings in series must be broken and two links which connect the windings in parallel must be substituted as shown below.

Input Voltage Range.		Tap Selector
200 - 220	100–110	0 and 105/210
210 - 230	110–120	+10 and 105/210
220 - 240	120–130	0 and +20
230 - 250	130–140	+10 and +20
105 105 o o o o 0 0	105 105 o o o o 0 0	+20 105/210 0 + 10 0 0 0 0

3.2. Fuse.

The instrument is supplied with a 0.5 Amp antisurge fuse for operation in the range of 200–250 volts. A fuse of twice the rating, i.e. 1 Amp is required when the instrument is changed for operation between 100 and 140 Volts.

3.3. Connection to the Mains Supply.

Connect the instrument to the mains supply via the three core lead as follows:

Red - Live.
Black - Neutral
Green - Earth.

3.4. Meter Adjustment

Before switching on check that the meter reads zero. If not, adjust the mechanical "set zero" screw on the meter. The Meter Unit is now ready for use with any one of the 700 series of Dymar Plug-In Instruments.

4. Technical Description

4.1. Meter

The Meter has a current sensitivity of 100μA for full scale deflection. It is adjusted by means of the preset potentiometer RV3 in such a way that the terminal impedance between pins 8 and 16 on the output socket is 3.16kΩ. The thermistor TH1 in parallel with R12 compensates for any resistance change of the actual meter movement with temperature.

4.2. 250 Volt Regulated Power Supply

The A.C. voltage from the Mains transformer is converted into "raw" D.C. of approximately 400 volts by means of the Silicon Diode Bridge D1 and the reservoir capacitor C.1. This voltage is also made available on pin 12 of the main output socket for use in plug-ins. The pentode half of the valve V1 is used as the series regulator with the triode half acting as the difference amplifier. Zener Diode D2 provides the reference voltage at the cathode of this triode. Potentiometer RV1 adjusts the output voltage to 250 Volts DC.

4.3. 12.6 Volt Regulated Power Supply

The design here is similar to the 250 Volt supply, except that silicon transistors are used as the active elements. D3 is the bridge rectifier giving unregulated DC across C6 and VT2 is the series regulator. VT3 is the difference amplifier which senses the difference between the actual voltage as seen at the base and the reference voltage of the Zener Diode D4 as applied to the emitter. VT1 is an emitter follower which augments the current gain of the amplifier. RV2 sets the output voltage to the required 12.6 Volts.

5. Maintenance & Calibration

5.1. Instruments required

Digital Voltmeter 0 1% Accuracy with an input impedance of 10MΩ or greater.

Calibrated Source of DC current 100μA ± 0.6%

Dummy Load Resistor 6.2kΩ, 10 watts
Dummy Load Resistor 2lΩ, 7.5 watts.

5.2. Adjustment of the 250 Volt Line

Connect the 6.2kΩ Dummy Load across the 250 Volt line (Sockets 13 and 14 on SK1) and with the D.V.M. across it adjust RV1 to read exactly 250 Volts.

5.3. Adjustment of the 12.6 Volt line

Connect the 2lΩ Dummy Load across the 12.6 Volt line (Sockets 5 and 6 on SK1) and with the D.V.M. across it adjust RV2 to read exactly 12.6 Volts.

5.4. Meter Adjustment

Connect the calibrated current source to the meter terminals (Sockets 8 and 16 on SK1) and adjust RV4 to have full scale deflection on the meter i.e. 100μA. Connect the D.V.M. across the same meter terminals and adjust RV3 to get a reading of exactly 0.316 Volts on the D.V.M. when the current is 100μA. This completes all the adjustments required to the Meter Unit.

PARTS LIST

CIRCUIT REF.	DESCRIPTION		
	RESISTORS		
R1.	Carbon	2.2K ±5%	½W
R2.	Carbon	150K ±5%	½W
R3.	Carbon	270K ±5%	½W
R4.	Carbon	100K ±5%	½W
R5.	Carbon	22K ±5%	1W
R6.	Carbon	22K ±5%	1W
R7.	Carbon	390Ω ±5%	½W
R8.	Carbon	4.7K ±5%	½W
R9.	Carbon	680Ω ±5%	½W
R10.	Carbon	1K ±5%	½W
R11.	Carbon	1K ±5%	½W
R12.	Carbon	470Ω ±5%	½W
R13.	Carbon	1.8K ±5%	¼W
R14.	Carbon	150K ±5%	½W
RV1.	Variable	2.9K	
RV2.	Variable	500Ω	
RV3.	Variable	500Ω	
RV4.	Variable	500K	
	CAPACITORS		
C1/C2	Electrolytic	16 + 16μF	450V
C3	Polyester	0.1μF	250V
C4	Polyester	0.1μF	250V
C5	Electrolytic	8μF	350V
C6	Electrolytic	1250μF	40V
C7	Electrolytic	50μF	40V
C8	Polyester	0.022μF	250V
C9	Electrolytic	125μF	16V
C10	Electrolytic	250μF	16V
	VALVES		
V1	Valve Triode Pentode	Mullard ECL82	

PARTS LIST

CIRCUIT REF.	DESCRIPTION	

SEMICONDUCTORS

D1	Silicon Bridge Rectifier	Raytheon PM4405
D2	Silicon Zener Diode	Mullard BZY95-C75
D3	Silicon Bridge Rectifier	Raytheon PM4010
D4	Silicon Zener Diode	A.E.I. MR162H
VT1	Transistor Silicon	Texas 2N3704
VT2	Transistor Silicon	R.C.A. 40310
VT3	Transistor Silicon	Texas 2N3704

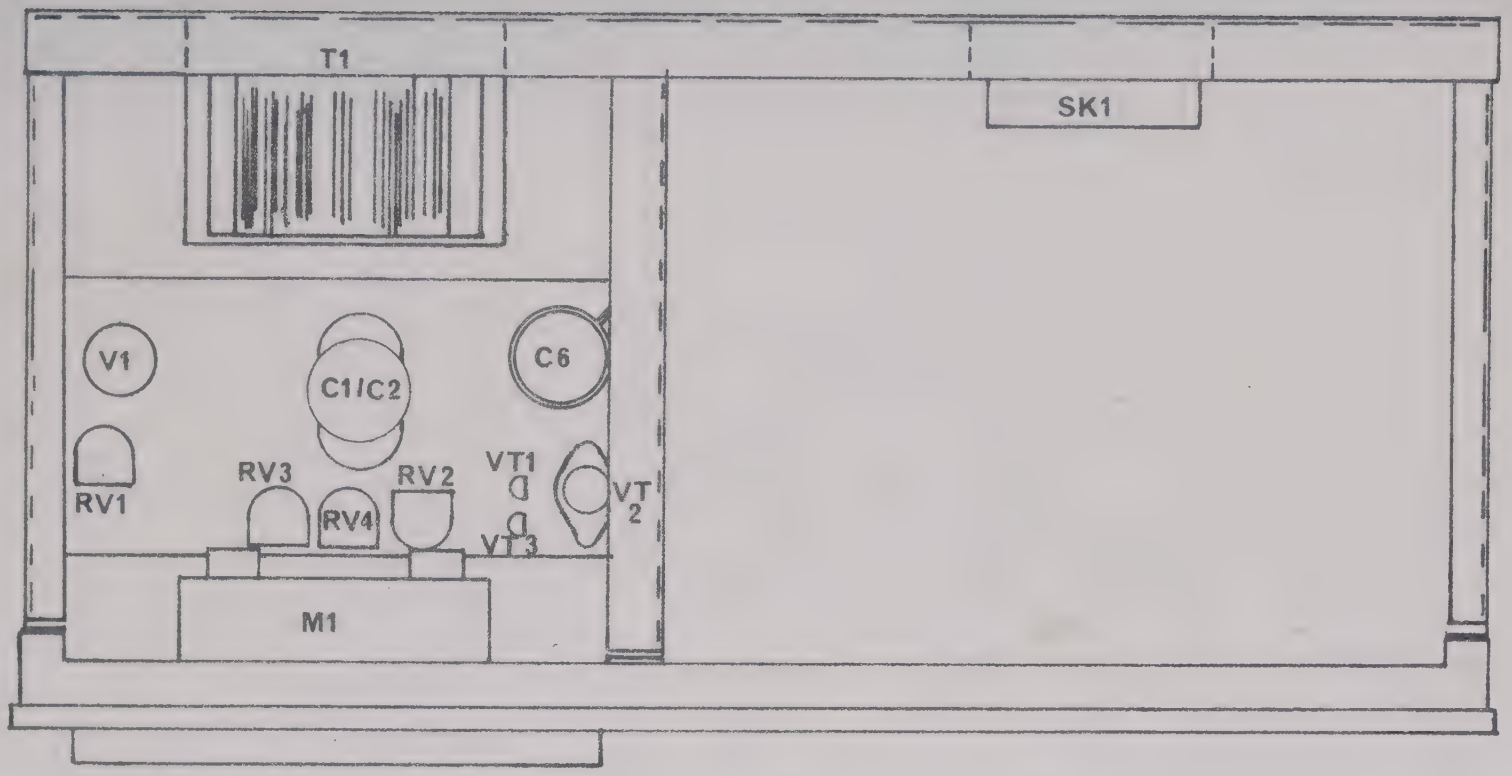
MISCELLANEOUS

TH1	Thermistor	VA1098	Mullard
T1	Transformer Dymar Drg. No.	BT1426	
M1	Meter Dymar Drg. No.	BD1385	
SK1	Socket 16 way Dowel Polarised		McMurdo RSD16
S1	Switch Double Pole S277PD (With Chrome Plated Hex. Nut)		Bulgin
F1	Fuse link 500MA Type L338		Belling & Lee
LP1	Lamp L.E.S. 6.5V 1 Watt Type E5/SCAD No. 674		Vitality

COMPONENT CHANGE

1) Components Part Ref: R.12 and TH1 Deleted. 560Ω Resistor inserted as replacement.

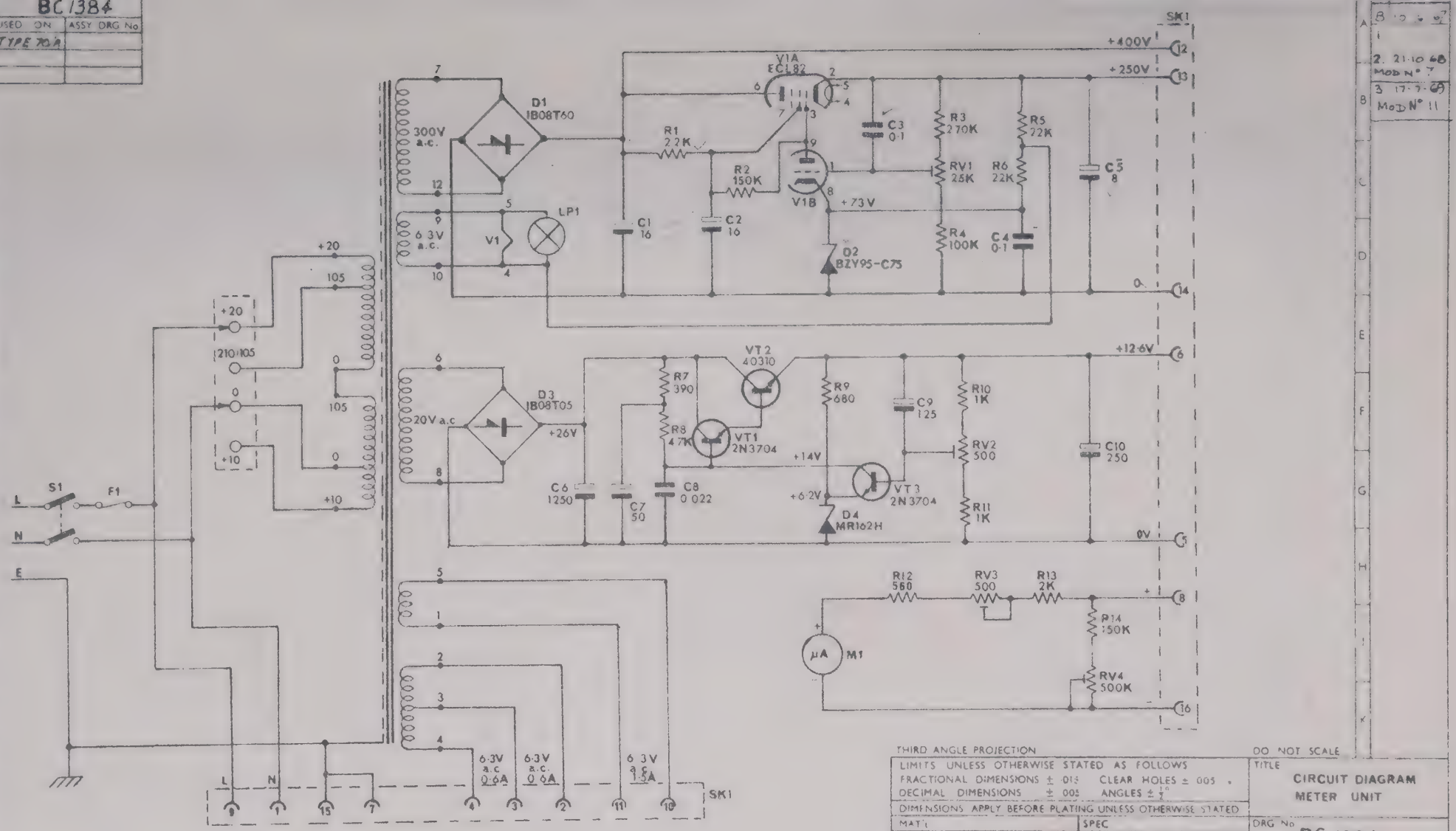
2) R.13 Value changed from 1.8KΩ to 2.0KΩ.



VIEW ON TOP OF UNIT

BC 1384

USED ON	ASSY DRG No
TYPE 70A	



A	B	C	D	E	F	G	H	J	K	L	M

A	B 10 5 67
	1
	2. 21-10-68 MOD N° 7
	3 17-9-69 MOD N° 11

THIRD ANGLE PROJECTION — DO NOT SCALE

LIMITS UNLESS OTHERWISE STATED AS FOLLOWS
FRACTIONAL DIMENSIONS ± .015 CLEAR HOLES ± .005
DECIMAL DIMENSIONS ± .005 ANGLES ± 1°
DIMENSIONS APPLY BEFORE PLATING UNLESS OTHERWISE STATED

MAT'L | SPEC
FINISH
ALL DIMENSIONS IN INCHES | SCALE

DYMAR ELECTRONICS LTD.
WATFORD, HERTS, ENGLAND.

TITLE: CIRCUIT DIAGRAM METER UNIT

DRG No BC 1384
DRN J. SOPPITT DATE 25·9·67
CH'D DATE
APP'D DATE

G U A R A N T E E

In lieu of any warranty, condition or liability implied by law, our liability in respect of any defect in or failure of the goods supplied, is limited to making good by replacement or repair defects which, under proper use by the original purchaser, appear therein and arise solely from faulty materials or workmanship within a period of twelve calendar months after the original goods shall have first been dispatched, at the termination of which period all liability on our part ceases; provided always that such defective instruments are carefully packed and returned free to our Works unless otherwise arranged, and provided that they have not been tampered with in any way.

For components not of our manufacture we extend only such benefits as we may receive under any Guarantee given to us by the makers thereof.

The liability of the Company for consequantial loss or damage suffered by the Purchaser of the goods supplied by it, however sustained is hereby expressly excluded.

Our equipment has been designed and tested for use with the specific types of components supplied by us therein and no responsibility can be accepted for the performance of the equipment if other components are employed.

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In the event of failure of malfunctioning of any equipment supplied by us please contact our Service Department, at the below stated address and give full details of the fault together with the Type and Serial Number of the equipment in question.

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